PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-058659

(43)Date of publication of application : 03.03.1995

(51)Int.Cl. H04B 1/38

(21)Application number : 05-226660

(22)Date of filing : 20.08.1993

(71)Applicant : KENWOOD CORP

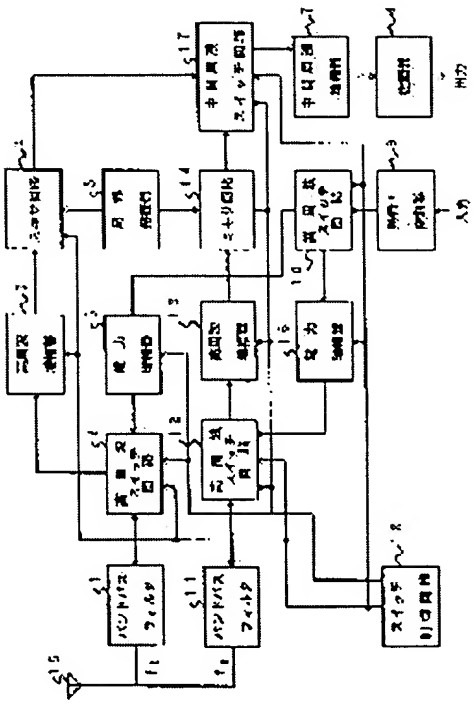
(72)Inventor : YAMAGISHI TSUTOMU

(54) RADIO TRANSMITTER-RECEIVER

(57)Abstract:

PURPOSE: To select a transmission frequency band and a reception frequency band and to perform highly sensitive reception by turning off a reception part which does not perform reception and a transmission part which does not perform transmission.

CONSTITUTION: During fb frequency band reception and fa frequency band transmission, a high frequency switching circuit 2 is switched to the side of a high frequency amplifier 3, the high frequency switching circuit 12 is switched to the side of a power amplifier 16 and an intermediate switching circuit 17 is switched to the side of a mixer circuit 4. Thus, the reception signals of an fb frequency band passed through a BPF 1 passes through the circuit 2, lead to the side of the amplifier 3, passes through the intermediate frequency switching circuit 17 and demodulated in a demodulator 8. In the meantime, output modulation wave signals from an oscillator/modulator 9 are transmitted through the BPF 11 and an antenna 15. Also, during fb frequency band transmission and fa frequency band reception, the circuit 2 is switched to the side of the high frequency amplifier 13, the high frequency switching circuit 12 is switched to the side of the power amplifier 16 and the circuit 17 is switched to the side of the mixer circuit 14.



LEGAL STATUS

[Date of request for examination] 18.07.1997

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	3102731
[Date of registration]	25.08.2000
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

(19)日本国特許庁(JP)　(12)公開特許公報（A）　(11)特許出願公開番号
特開平７－５８６５９
(43)公開日　平成7年(1995)3月3日

(51)Int. Cl.⁶　識別記号　庁内整理番号　ＦＩ　技術表示箇所
Ｈ０４Ｂ　1/38

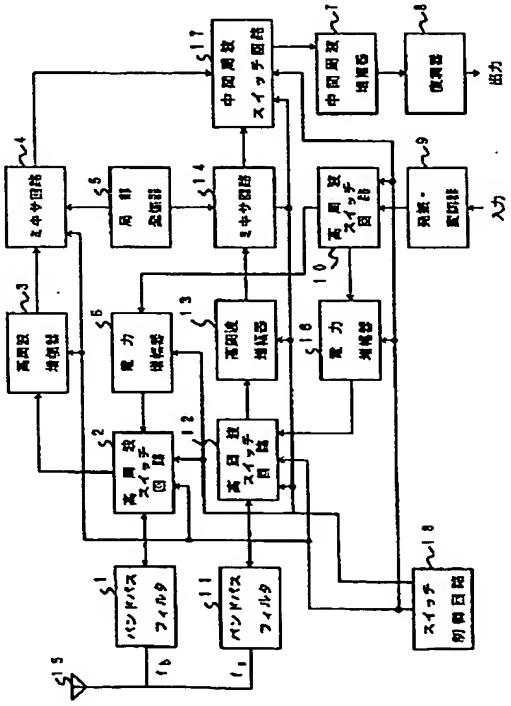
審査請求　未請求　請求項の数２　ＦＤ　（全９頁）

(21)出願番号　特願平5-226660
(22)出願日　平成5年(1993)8月20日

(71)出願人　000003595
株式会社ケンウッド
東京都渋谷区道玄坂1丁目14番6号
(72)発明者　山岸　勉
東京都渋谷区渋谷1丁目2番5号　株式会社ケンウッド内
(74)代理人　弁理士　砂子　信夫

(54)【発明の名称】無線送受信機

(57)【要約】
【目的】　小型でかつ安価な構成によって、送信周波数帯域と受信周波数帯域を選択できかつ高感度の受信が可能な無線送受信機を提供する。
【構成】　バンドパスフィルタ１を介した受信信号を高周波スイッチ回路２を通して受ける第１受信部を構成する高周波増幅器３およびミキサ回路４と、バンドパスフィルタ１１を介した受信信号を高周波スイッチ回路１２を通して受ける第２受信部を構成する高周波増幅器１３およびミキサ回路１４と、高周波スイッチ回路２を介して送信出力を送出する電力増幅器６と、高周波スイッチ回路２を介して送信出力を送出する電力増幅器１６と、第１受信部の出力または第２の受信部の出力を選択する中間周波スイッチ回路１７とを備え、複信通信のときに受信しない方の受信部および送信出力を送出しない方の電力増幅器を非動作状態に制御するようにした。



1

【特許請求の範囲】

【請求項１】　異なる周波数帯で送信と受信とが同時に行える複信方式の無線送受信機において、

アンテナに接続された通過周波数帯域が異なる第１および第２のバンドパスフィルタと、

第１のバンドパスフィルタに接続された第１の高周波スイッチ回路および第２のバンドパスフィルタに接続された第２の高周波スイッチ回路と、

第１の高周波スイッチ回路を通した受信信号を増幅して中間周波数に変換する第１の受信部および第１の高周波スイッチ回路を通した受信信号を増幅して中間周波数に変換する第２の受信部と、

第１の高周波スイッチ回路を通して第１のバンドパスフィルタの通過周波数帯域の周波数の送信をする第１の送信部および第２の高周波スイッチ回路を通して第２のバンドパスフィルタの通過周波数帯域の周波数の送信をする第２の送信部と、

第１および第２の受信部からの出力の一方を選択して中間周波増幅器へ出力する選択手段と、

第１のバンドパスフィルタの通過周波数帯域の周波数の受信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数による送信を行うとき、第１の受信部を動作状態に、第２の受信部を非動作状態に、第１の送信部を非動作状態に、第２の送信部を動作状態に、第１の高周波スイッチ回路を第１の受信部へ受信信号を導く側に、第２の高周波スイッチ回路を第２の送信部の出力通過側におよび選択手段を第１の受信部からの出力選択側に制御し、かつ第１のバンドパスフィルタの通過周波数帯域の周波数による送信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数の受信を行うとき、第１の受信部を非動作状態に、第２の受信部を動作状態に、第１の送信部を動作状態に、第２の送信部を非動作状態に、第１の高周波スイッチ回路を第１の送信部の出力通過側に、第２の高周波スイッチ回路を第２の受信部へ受信信号を導く側におよび選択手段を第２の受信部からの出力選択側に制御する制御手段と、

を備えたことを特徴とする無線送受信機。

【請求項２】　請求項１記載の無線送受信機において、制御手段は、第１のバンドパスフィルタからの受信信号を第１の受信部に導く第１のダイオードスイッチ回路と、第１の送信部の出力を第１のバンドパスフィルタに導く第２のダイオードスイッチ回路と、第２のバンドパスフィルタからの受信信号を第２の受信部に導く第３のダイオードスイッチ回路と、第２の送信部の出力を第２のバンドパスフィルタへ導く第４のダイオードスイッチ回路と、第１の受信部の出力を選択する第５のダイオードスイッチ回路と、第２の受信部の出力を選択する第６のダイオードスイッチ回路と、第１のバンドパスフィルタの通過周波数帯域の周波数の受信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数による送信を行う場合に第１、第４および第５のダイオードスイッチ回路をオン状態に制御すると共に第１の受信部および第２の送信部に電源を供給する第１のトランジスタスイッチ手段と、第１のバンドパスフィルタの通過周波数帯域の周波数による送信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数の受信を行う場合に第２、第３および第６のダイオードスイッチ回路をオン状態に制御すると共に第２の受信部および第１の送信部に電源を供給する第１のトランジスタスイッチ手段とを備えたことを特徴とする無線送受信機。

2

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は異なる周波数で送信と受信とが同時に行える複信方式の無線送受信機に関し、さらに詳細には送信周波数帯域と受信周波数帯域を選択できる複信方式の無線送受信機に関する。

【０００２】

【従来の技術】この種の従来の無線送受信機は、例えば図６に示すように構成されて、アンテナ発振・変調器２０から出力される被変調波出力を電力増幅器２１によって増幅し、電力増幅された被変調波出力をアンテナ１５から送信する。アンテナ１５によって受信した受信波は高周波スイッチ回路２２を介して選択的にバンドパスフィルタ２３または２４の一方にに供給し、バンドパスフィルタ２３、２４からの出力は高周波スイッチ回路２５を介して取り出し、高周波増幅器２６に供給して増幅し、増幅出力はミキサ回路２７に供給して局部発振器２８からの発振出力と周波数混合し、ミキサ回路２７の出力は中間周波増幅器２９に供給して増幅し、復調回路３０に供給して復調している。高周波スイッチ回路２２および２５はスイッチ制御回路３１によって送受信周波数に基づいて制御する。

【０００３】上記した、従来の無線送受信機によってｆｂ周波数帯で受信中にｆａ周波数帯で送信する複信の場合には、発振・変調器２０をｆａ周波数帯に設定し、電力増幅器２１を経て送信する。一方、高周波スイッチ回路２２および２５はバンドパスフィルタ２４（通過周波数帯域ｆｂ）側に切り換え、バンドパスフィルタ２４を通過した受信信号を高周波増幅器２６において増幅し、中間周波数に周波数変換し、中間周波増幅器２９によって増幅し、復調回路３０によって復調して出力する。逆に、ｆａ周波数帯で受信中にｆｂ周波数帯で送信する複信の場合には、発振・変調器２０をｆｂ周波数帯に設定し、電力増幅器２１を経て送信する。一方、高周波スイッチ回路２２および２５はバンドパスフィルタ２３（通過周波数帯域ｆａ）側に切り換え、バンドパスフィルタ２３を通過した受信信号を高周波増幅器２６に導く。

【０００４】

【発明が解決しようとする課題】しかしながら、上記した従来の無線送受信機によるときは、高周波スイッチ回

路のアイソレーションが悪いと送信機の出力電力が漏れ、漏れた送信出力が送信周波数帯域を通過帯域とするバンドパスフィルタを通って高周波増幅器に加わるという問題点があった。さらに、漏れが多く、このレベルが高いと、高周波増幅器およびミキサが感度抑圧を起こし、受信感度が大きく低下するという問題点が生ずる。そこで、高感度にて受信するには、高周波スイッチ回路をアイソレーションのよい回路にする必要があるが、アイソレーションのよい高周波スイッチ回路は大型化し、かつ高価になるという問題点があった。

【０００５】本発明は、小型でかつ安価な構成によって、送信周波数帯域と受信周波数帯域を選択できかつ高感度の受信が可能な無線送受信機を提供することを目的とする。

【０００６】

【課題を解決するための手段】本発明の無線送受信機は、異なる周波数帯で送信と受信とが同時に行える複信方式の無線送受信機において、アンテナに接続された通過周波数帯域が異なる第１および第２のバンドパスフィルタと、第１のバンドパスフィルタに接続された第１の高周波スイッチ回路および第２のバンドパスフィルタに接続された第２の高周波スイッチ回路と、第１の高周波スイッチ回路を通した受信信号を増幅して中間周波数に変換する第１の受信部および第１の高周波スイッチ回路を通した受信信号を増幅して中間周波数に変換する第２の受信部と、第１の高周波スイッチ回路を通して第１のバンドパスフィルタの通過周波数帯域の周波数の送信をする第１の送信部および第２の高周波スイッチ回路を通して第２のバンドパスフィルタの通過周波数帯域の周波数の送信をする第２の送信部と、第１および第２の受信部からの出力の一方を選択して中間周波増幅器へ出力する選択手段と、第１のバンドパスフィルタの通過周波数帯域の周波数の受信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数による送信を行うとき、第１の受信部を動作状態に、第２の受信部を非動作状態に、第１の送信部を非動作状態に、第２の送信部を動作状態に、第１の高周波スイッチ回路を第１の受信部へ受信信号を導く側に、第２の高周波スイッチ回路を第２の送信部の出力通過側におよび選択手段を第１の受信部からの出力選択側に制御し、かつ第１のバンドパスフィルタの通過周波数帯域の周波数による送信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数の受信を行うとき、第１の受信部を非動作状態に、第２の受信部を動作状態に、第１の送信部を動作状態に、第２の送信部を非動作状態に、第１の高周波スイッチ回路を第１の送信部の出力通過側に、第２の高周波スイッチ回路を第２の受信部へ受信信号を導く側におよび選択手段を第２の受信部からの出力選択側に制御する制御手段と、を備えたことを特徴とする。

【０００７】本発明の無線送受信機において、制御手段

は、第１のバンドパスフィルタからの受信信号を第１の受信部に導く第１のダイオードスイッチ回路と、第１の送信部の出力を第１のバンドパスフィルタに導く第２のダイオードスイッチ回路と、第２のバンドパスフィルタからの受信信号を第２の受信部に導く第３のダイオードスイッチ回路と、第２の送信部の出力を第２のバンドパスフィルタへ導く第４のダイオードスイッチ回路と、第１の受信部の出力を選択する第５のダイオードスイッチ回路と、第２の受信部の出力を選択する第６のダイオードスイッチ回路と、第１のバンドパスフィルタの通過周波数帯域の周波数の受信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数による送信を行う場合に、第１、第４および第５のダイオードスイッチ回路をオン状態に制御すると共に第１の受信部および第２の送信部に電源を供給する第１のトランジスタスイッチ手段と、第１のバンドパスフィルタの通過周波数帯域の周波数による送信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数の受信を行う場合に、第２、第３および第６のダイオードスイッチ回路をオン状態に制御すると共に第２の受信部および第１の送信部に電源を供給する第１のトランジスタスイッチ手段とを備えたことを特徴とする。

【０００８】

【作用】本発明の無線送受信機は、第１のバンドパスフィルタの通過周波数帯域の周波数の受信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数による送信を行うときには、第１のバンドパスフィルタを通して受信した受信信号が第１の受信部において受信され、第１の受信部からの出力は選択手段によって選択される。一方、第２の送信部からの送信出力は第２のバンドパスフィルタを介してアンテナから送信される。このときに、第１、第２高周波スイッチ回路および中間周波スイッチ回路のアイソレーションが悪くても、第２の受信部および第１の送信部は非動作状態に制御されているために、第２受信部および第１送信部は減衰器として作用し、第１受信部の感度抑圧は低減されて、高感度の受信ができることになる。第１のバンドパスフィルタの通過周波数帯域の周波数による送信を行うと共に第２のバンドパスフィルタの通過周波数帯域の周波数の受信を行うときには、第２のバンドパスフィルタを通して受信した受信信号が第２の受信部において受信され、第２の受信部からの出力は選択手段によって選択される。一方、第１の送信部からの送信出力は第１のバンドパスフィルタを介してアンテナから送信される。このときに、第１、第２高周波スイッチ回路および中間周波スイッチ回路のアイソレーションが悪くても、第１の受信部および第２の送信部は非動作状態に制御されているために、第１受信部および第２送信部は減衰器として作用し、第２受信部の感度抑圧は低減されて、高感度の受信ができることになる。

【０００９】

【実施例】以下、本発明を実施例により説明する。図１は本発明の一実施例の構成を示すブロック図である。

【００１０】アンテナ１５にはｆｂ周波数帯域のＲＦ信号を通過帯域とするバンドパスフィルタ１が接続してあって、アンテナ１５にて電気信号に変換されたｆｂ周波数帯域のＲＦ信号はバンドパスフィルタ１を通して高周波スイッチ回路２に供給し、高周波スイッチ回路２を通ったＲＦ信号を高周波増幅器３に供給して増幅し、増幅ＲＦ信号をミキサ回路４に導いて局部発振器５の発振出力の周波数と周波数混合して中間周波数に変換するように、ｆｂ周波数帯の受信側が構成してある。

【００１１】一方、送信側については、マイクロフォンなどからの入力信号を発振・変調器９に導いて、発振・変調器９において発振される搬送波信号を入力信号によって変調し、発振・変調器９から出力される変調波信号は高周波スイッチ回路１０を介して電力増幅器６に供給して、電力増幅し、増幅出力を高周波スイッチ回路２を介してバンドパスフィルタ１を通してアンテナ１５から送信するように構成してある。

【００１２】さらに、アンテナ１５にはｆａ周波数帯域のＲＦ信号を通過帯域とするバンドパスフィルタ１１が接続してあって、アンテナ１５にて電気信号に変換されたｆａ周波数帯域のＲＦ信号はバンドパスフィルタ１１を通して高周波スイッチ回路１２に供給し、高周波スイッチ回路１２を通ったＲＦ信号を高周波増幅器１３に供給して増幅し、増幅ＲＦ信号をミキサ回路１４に導いて局部発振器５の発振出力の周波数と周波数混合して中間周波数に変換するように、ｆａ周波数帯の受信側が構成してある。さらに、ミキサ回路４から出力される中間周波信号とミキサ回路１４から出力される中間周波信号とは中間周波スイッチ回路１７に供給して一方を選択して中間周波増幅器７に供給し、増幅された中間周波信号を復調器８に供給して復調し、出力するように構成してある。

【００１３】一方、発振・変調器９からの変調波信号は高周波スイッチ回路１０を介して電力増幅器１６に供給して、電力増幅し、増幅出力を高周波スイッチ回路１２を介してバンドパスフィルタ１１を通してアンテナ１５から送信するように構成してある。

【００１４】すなわち、本実施例の無線送受信機は、中間周波段を共通にした同様構成の一対の受信側高周波段部と、発振・変調器を共通にした同様構成の一対の送信部とで構成してある。

【００１５】ここで、ｆｂ周波数帯受信、ｆａ周波数帯送信中は、スイッチ制御回路１８の制御のもとに、高周波増幅器３、ミキサ回路４および電力増幅器１６を動作状態に制御し、高周波増幅器１３、ミキサ回路１４および電力増幅器６を非動作状態に制御し、バンドパスフィルタ１の出力を高周波増幅器３に導く状態に高周波スイッチ回路２を制御し、電力増幅器１６からの出力をバンドパスフィルタ１１に導く状態に高周波スイッチ回路１２を制御し、発振・変調器９からの出力被変調波信号を電力増幅器１６に導く状態に高周波スイッチ回路１０を制御し、ミキサ回路４によって周波数変換された中間周波信号を中間周波増幅器７へ導く状態に中間周波スイッチ回路１７をそれぞれ制御する。

【００１６】一方、ｆａ周波数帯受信、ｆｂ周波数帯送信中は、スイッチ制御回路１８の制御のもとに、高周波増幅器３、ミキサ回路４および電力増幅器１６を非動作状態に制御し、高周波増幅器１３、ミキサ回路１４および電力増幅器６を動作状態に制御し、バンドパスフィルタ１１の出力を高周波増幅器１３に導く状態に高周波スイッチ回路１２を制御し、電力増幅器６からの出力をバンドパスフィルタ１に導く状態に高周波スイッチ回路２を制御し、発振・変調器９からの出力被変調波信号を電力増幅器６に導く状態に高周波スイッチ回路１０を制御し、ミキサ回路１４によって周波数変換された中間周波信号を中間周波増幅器７へ導く状態に中間周波スイッチ回路１７をそれぞれ制御する。

【００１７】高周波スイッチ回路２は、図２に示すようにダイオードＤ１およびＤ２をスイッチング素子とするダイオードスイッチ回路にて構成し、ｆｂ周波数帯受信、ｆａ周波数帯送信中、高電位信号を制御信号として端子Ａに印加してダイオードＤ２をオン状態に制御し、バンドパスフィルタ１からの出力を高周波増幅器３に導き、ｆａ周波数帯受信、ｆｂ周波数帯送信中、高電位信号を制御信号として端子Ｂに印加してダイオードＤ１をオン状態に制御して電力増幅器６からの出力をバンドパスフィルタ１に導く。

【００１８】高周波スイッチ回路１２も図２と同様に、ダイオードＤ１およびＤ２をスイッチング素子とするダイオードスイッチ回路にて構成し、ｆｂ周波数帯受信、ｆａ周波数帯送信中、高電位信号を制御信号として端子（Ａ）に印加してダイオードＤ１をオン状態に制御し、電力増幅器１６からの出力をバンドパスフィルタ１１に導き、ｆａ周波数帯受信、ｆｂ周波数帯送信中、高電位信号を制御信号として端子（Ｂ）に印加してダイオードＤ２をオン状態に制御してバンドパスフィルタ１１からの出力を高周波増幅器１３に導く。

【００１９】高周波スイッチ回路１０も図２と同様に、ダイオードＤ１およびＤ２をスイッチング素子とするダイオードスイッチ回路にて構成し、ｆｂ周波数帯受信、ｆａ周波数帯送信中、高電位信号を制御信号として端子（Ａ）に印加してダイオードＤ１をオン状態に制御し、発振・変調器１０からの出力変調波信号を電力増幅器１６に導き、ｆａ周波数帯受信、ｆｂ周波数帯送信中、高電位信号を制御信号として端子（Ｂ）に印加してダイオードＤ２をオン状態に制御して発振・変調器１０からの出力変調波信号を電力増幅器６に導く。

【００２０】中間周波スイッチ回路１７は、図３に示すようにダイオードＤ３およびＤ４をスイッチング素子とするダイオードスイッチ回路にて構成し、ｆｂ周波数帯受信、ｆａ周波数帯送信中、高電位信号を制御信号として端子Ａに印加してダイオードＤ３をオン状態に制御し、ミキサ回路４から出力される中間周波信号を中間周波増幅器７に導き、ｆａ周波数帯受信、ｆｂ周波数帯送信中、高電位信号を制御信号として端子Ｂに印加してダイオードＤ４をオン状態に制御し、ミキサ回路１４から出力される中間周波信号を中間周波増幅器７に導く。

【００２１】スイッチ制御回路１８は、図４に示すように無線送受信機を制御するマイクロコンピュータ１９から、ｆｂ周波数帯受信、ｆａ周波数帯送信中のみ低電位となる電圧がトランジスタＱ１のベースに電流を流しトランジスタＱ１をオン状態に制御し、トランジスタＱ１を介した電圧を電源電圧として高周波増幅器３、ミキサ回路４および電力増幅器１６に電源電圧として印加して動作状態に制御すると共に、高周波スイッチ回路２、１０、１２および中間周波スイッチング回路６の端子Ａ（Ａ）に印加して、バンドパスフィルタ１の出力を高周波増幅器３に導き、電力増幅器１６からの出力をバンドパスフィルタ１１に導き、発振・変調器９からの出力被変調波信号を電力増幅器１６に導き、ミキサ回路４によって周波数変換された中間周波信号を中間周波増幅器７へ導くように制御する。

【００２２】また、スイッチ制御回路１８は、ｆａ周波数帯受信、ｆｂ周波数帯送信中のみ低電位となる電圧がトランジスタＱ２のベースに電流を流しトランジスタＱ２をオン状態に制御し、トランジスタＱ２を介した電圧を電源電圧として高周波増幅器１３、ミキサ回路１４および電力増幅器６に電源電圧として印加して動作状態に制御すると共に、高周波スイッチ回路２、１０、１２および中間周波スイッチング回路６の端子Ｂ（Ｂ）に印加して、バンドパスフィルタ１１の出力を高周波増幅器１３に導き、電力増幅器６からの出力をバンドパスフィルタ１に導き、発振・変調器９からの出力変調波信号を電力増幅器６に導き、ミキサ回路１４によって周波数変換された中間周波信号を中間周波増幅器７へ導く状態に中間周波スイッチ回路１７をそれぞれ制御する。

【００２３】また、バンドパスフィルタ１および１１の通過周波数特性は図５においてａおよびｂに示す特性を有するように構成してある。

【００２４】上記のように構成された本実施例の無線送受信機において、ｆｂ周波数帯受信、ｆａ周波数帯送信中は、トランジスタＱ１がオン状態に制御され、トランジスタＱ１を介した電圧が電源電圧として印加されて高周波増幅器３、ミキサ回路４および電力増幅器１６が動作状態にされ、高周波スイッチ回路２、１０、１２および中間周波スイッチング回路６の端子Ａ（Ａ）に印加される。したがって、高周波スイッチ回路２は高周波増幅器３側に、高周波スイッチ回路１２は電力増幅器１６側に、中間周波スイッチ回路１７はミキサ回路４側に切り換えられる。

【００２５】したがって、バンドパスフィルタ１を通ったｆｂ周波数帯の受信信号が高周波スイッチ回路２を通して高周波増幅器３に導かれて、高周波増幅器３において増幅され、ミキサ回路４において中間周波信号に周波数変換されて、中間周波スイッチ回路１７を通して中間周波増幅器７に導かれて増幅され、復調器８において復調される。

【００２６】一方、発振・変調器９はｆａ周波数周波数帯の搬送波を発振しこれに変調をかけ、発振・変調器９からの出力変調波信号は高周波スイッチ回路１０を通して電力増幅器１６に供給され、電力増幅器１６において電力増幅され、電力増幅された送信出力は高周波スイッチ回路１２を通してバンドパスフィルタ１１、アンテナ１５を介して送信される。この結果、ｆａ周波数帯の送信出力の送信が行われ、ｆｂ周波数帯の受信信号の受信が行われる複信による通信がなされる。

【００２７】なお、この場合は高周波増幅器１３、ミキサ回路１４および電力増幅器６は動作状態に制御されず、非動作状態にされている。したがって、高周波スイッチ回路２および１０のアイソレションがそれほど良くなくて、高周波スイッチ回路１０からの送信出力の漏れが多いときにおいても、電力増幅器６は非動作状態に制御されているため、周波数ｆａの漏れた高周波信号が高周波増幅器３に漏れることはなく、さらに、高周波スイッチ回路１２のアイソレーションがそれほど良くなくて電力増幅器１６からの送信出力の漏れが多いときにおいても、高周波増幅器１３およびミキサ回路１４は非動作状態に制御されているため、周波数ｆａの漏れた送信出力が中間周波スイッチ回路１７に漏れることはなく、中間周波スイッチ回路１７のアイソレーションがそれほど良くなくても、ミキサ回路４側に漏れることはない。

【００２８】すなわち、高周波増幅器３およびミキサ回路４において感度抑圧を起こすことはなく、非動作状態となっている電力増幅器６、高周波増幅器１３およびミキサ回路１４が減衰器として作用し、漏れ送信出力を小さくするため、この結果、感度抑圧は小さく、ｆｂ周波数帯受信が高感度の受信ができる。

【００２９】また、逆にｆｂ周波数帯送信、ｆａ周波数帯受信中は、トランジスタＱ２がオン状態に制御され、トランジスタＱ２を介した電圧が電源電圧として印加されて高周波増幅器１３、ミキサ回路１４および電力増幅器６が動作状態にされ、高周波スイッチ回路２、１０、１２および中間周波スイッチング回路６の端子Ｂ（Ｂ）に印加される。したがって、高周波スイッチ回路２は高周波増幅器１３側に、高周波スイッチ回路１２は電力増幅器６側に、中間周波スイッチ回路１７はミキサ回路１４側に切り換えられる。

【００３０】したがって、バンドパスフィルタ１１を通ったｆａ周波数帯の受信信号が高周波スイッチ回路１２を通して高周波増幅器１３に導かれて、高周波増幅器１３において増幅され、ミキサ回路１４において中間周波信号に周波数変換されて、中間周波スイッチ回路１７を通して中間周波増幅器７に導かれて増幅され、復調器８において復調される。

【００３１】一方、発振・変調器９はｆｂ周波数周波数帯の搬送波を発振しこれに変調をかけ、発振・変調器９からの出力変調波信号は高周波スイッチ回路１０を通して電力増幅器６に供給され、電力増幅器６において電力増幅され、電力増幅された送信出力は高周波スイッチ回路２を通してバンドパスフィルタ１、アンテナ１５を介して送信される。この結果、ｆｂ周波数帯の送信出力の送信が行われ、ｆａ周波数帯の受信信号の受信が行われる複信による通信がなされる。

【００３２】なお、この場合は高周波増幅器３、ミキサ回路４および電力増幅器１６は動作状態に制御されず、非動作状態にされている。したがって、この場合において高周波スイッチ回路１２および１０のアイソレーションがそれほど良くなくて、高周波スイッチ回路１２からの送信出力の漏れが多いときにおいても、電力増幅器１６は非動作状態に制御されているため、周波数ｆｂの漏れた高周波信号出力が高周波増幅器１３に漏れることはなく、さらに、高周波スイッチ回路２のアイソレーションがそれほど良くなくて電力増幅器６からの送信出力の漏れが多いときにおいても、高周波増幅器３およびミキサ回路４は非動作状態に制御されているため、周波数ｆｂの漏れた送信出力が中間周波スイッチ回路１７に漏れることはなく、中間周波スイッチ回路１７のアイソレーションがそれほど良くなくても、ミキサ回路１４側に漏れることはない。

【００３３】すなわち、高周波増幅器１３およびミキサ回路１４において感度抑圧を起こすことはなく、非動作状態となっている電力増幅器１６、高周波増幅器３およびミキサ回路４が減衰器として作用し、漏れ送信出力を小さくするため、この結果、感度抑圧は小さく、ｆａ周波数帯受信が高感度の受信ができる。上記のように２つの異なる周波数での複信通信が高感度で行えると共に、送信周波数と受信周波数とを選択することができる。

【００３４】また、高周波増幅器３、ミキサ回路４および電力増幅器６、高周波増幅器１３、ミキサ回路１４および電力増幅器１６のそれぞれをさらに細かくオン・オフ制御することによって、単信通信がｆａ周波数帯、ｆｂ周波数帯で行え、さらに、ｆａ周波数帯とｆｂ周波数帯とを使用した半複信通信を行うこともできる。すなわち、ｆａ周波数帯とｆｂ周波数帯とによって単信通信、半複信通信、複信通信を選択することもできる。

【００３５】さらに、バンドパスフィルタ、高周波増幅器、ミキサ回路および電力増幅器の数を増加し、高周波スイッチ回路および中間周波スイッチ回路による選択数を増加することによって多数の周波数を選択することもできる。

【００３６】

【発明の効果】以上説明したように本発明によれば、受信していない方の受信部および送信していない方の送信部は非動作状態にされているため、第１、第２高周波スイッチ回路および中間周波スイッチ回路のアイソレーションが悪くても、非動作状態にされている受信部および送信部が減衰器として作用し、動作状態中の受信部への送信出力の漏れはきわめて少なくなる効果がある。また、このために動作中の信部漏れの影響を受けず、感度な受信ができることになる効果がある。

【００３７】また、制御手段はダイオードスイッチ回路およびトランジスタスイッチ手段で構成できるため、構成が簡単ですむという効果もある。

【図面の簡単な説明】

【図１】本発明の一実施例の無線送受信機の構成を示すブロック図である。

【図２】本発明の一実施例の無線送受信機における高周波スイッチ回路の構成を示す回路図である。

【図３】本発明の一実施例の無線送受信機における中間周波スイッチ回路の構成を示す回路図である。

【図４】本発明の一実施例の無線送受信機におけるスイッチ制御回路の構成を示すブロック図である。

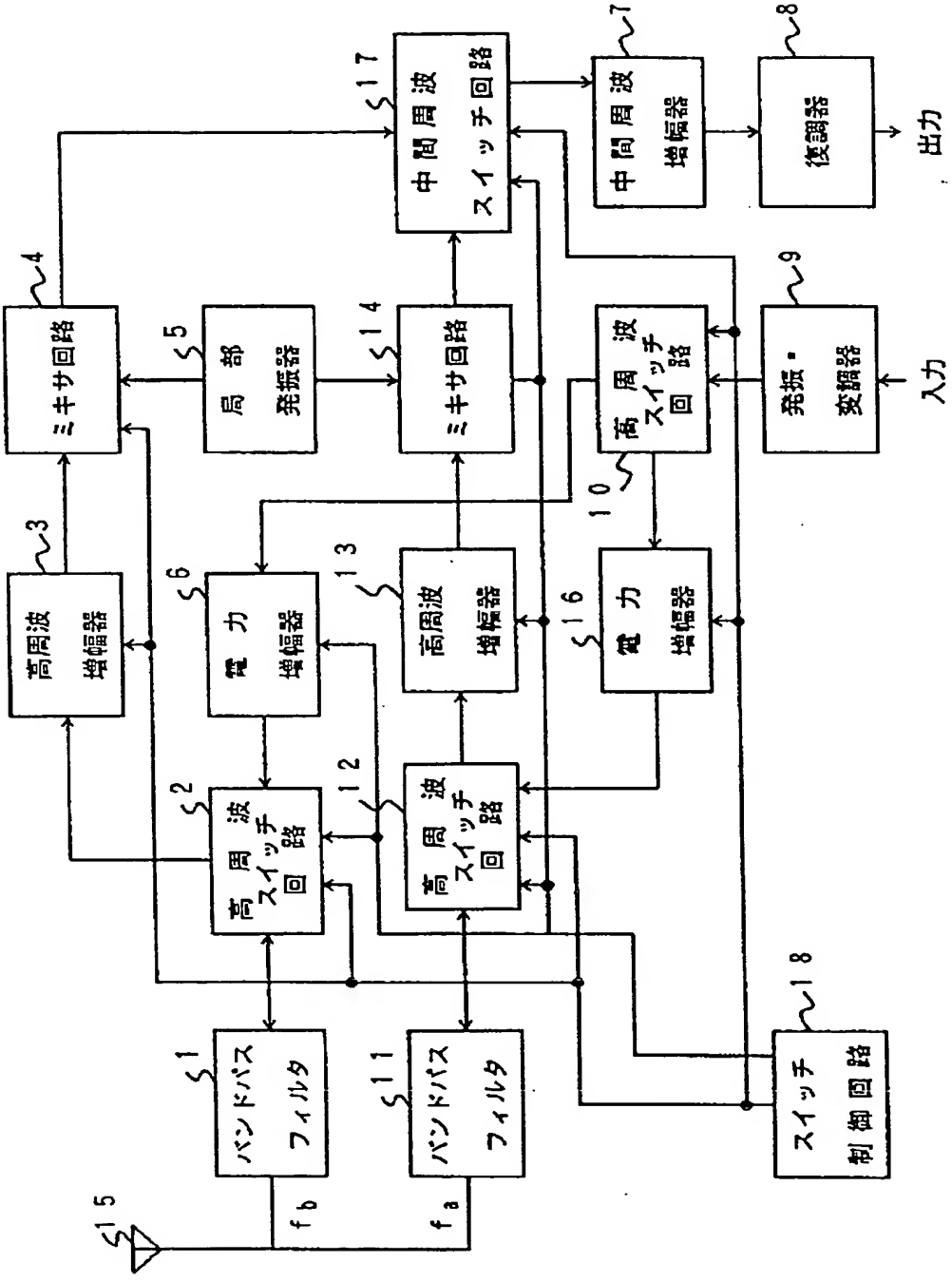
【図５】本発明の一実施例の無線送受信機におけるバンドパスフィルタの周波数特性図である。

【図６】従来例の無線送受信機の構成を示すブロック図である。

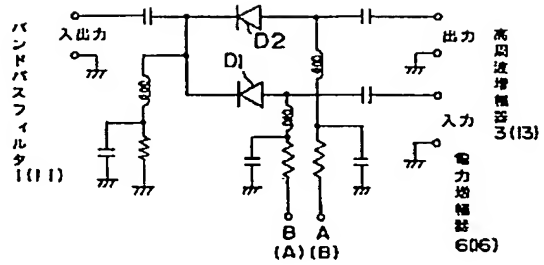
【符号の説明】

１および１１　バンドパスフィルタ
２、１０および１２　高周波スイッチ回路
３および１３　高周波増幅器
４および１４　ミキサ回路
５　局部発振器
６および１６　電力増幅器
７　中間周波増幅器
８　復調器
９　発振・変調器
１７　中間周波スイッチ回路
１８　スイッチ制御回路
１９　マイクロコンピュータ

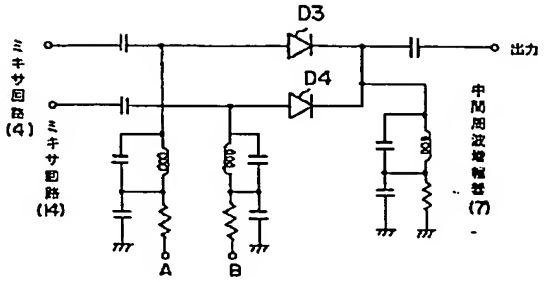
【図１】


中間周波スイッチ回路
17
中間周波増幅器
7
復調器
8
出力
ミキサ回路
4
局部発振器
5
ミキサ回路
14
高周波スイッチ回路
10
発振・変調器
9
入力
高周波増幅器
3
電力増幅器
6
高周波増幅器
13
電力増幅器
16
高周波スイッチ回路
2
高周波スイッチ回路
12
バンドパスフィルタ
1
バンドパスフィルタ
11
スイッチ制御回路
18
15
f_b
f_a

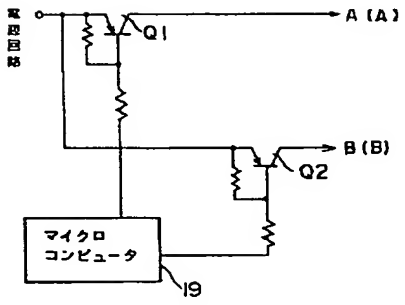
【図２】


入出力
D2
D1
出力
入力
B
A
(A)(B)

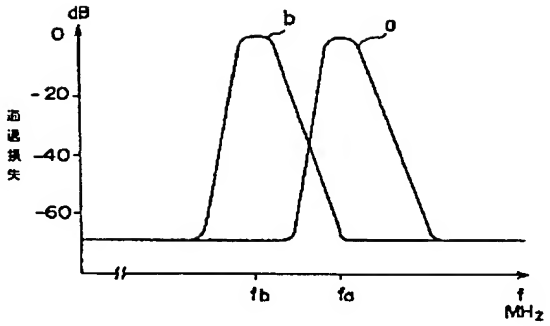
【図３】


D3
出力
D4
A
B

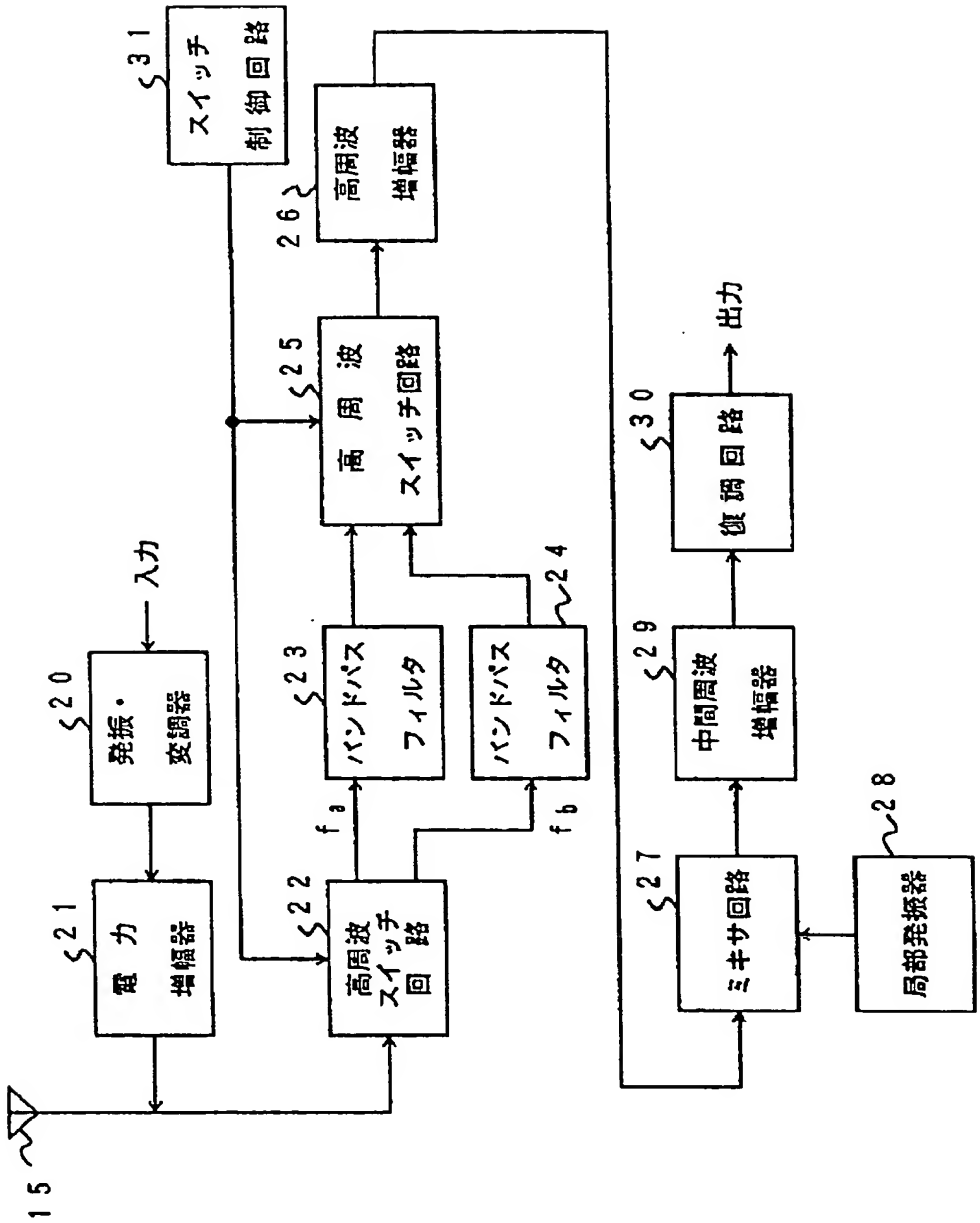
【図４】


A (A)
Q1
B (B)
Q2
マイクロ
コンピュータ
19

【図５】


dB
0
-20
-40
-60
b
a
fb
fa
f
MHz

【図６】


スイッチ制御回路
31
高周波増幅器
26
高周波スイッチ回路
25
入力
発振・変調器
20
バンドパスフィルタ
23
バンドパスフィルタ
24
復調回路
30
出力
電力増幅器
21
高周波スイッチ回路
22
f_a
f_b
中間周波増幅器
29
ミキサ回路
27
局部発振器
28
15

CLAIMS

[Claim(s)]
[Claim 1] In the radio receiver-transmitter of the duplex operation which can perform transmission and reception simultaneously with a different frequency band The 1st and 2nd band pass filters with which the passage frequency bands connected to the antenna differ, The 2nd high frequency switching circuit connected to the 1st high frequency switching circuit and 2nd band pass filter which were connected to the 1st band pass filter, With the 2nd receive section which amplifies the input signal which let the 1st receive section which amplifies the input signal which let the 1st high frequency switching circuit pass, and changes into an intermediate frequency, and the 1st high frequency switching circuit pass, and changes into an intermediate frequency The 2nd transmitting section which transmits the frequency of the passage frequency band of the 2nd band pass filter through the 1st transmitting section which transmits the frequency of the passage frequency band of the 1st band pass filter through the 1st high frequency switching circuit, and the 2nd high frequency switching circuit, A selection means to choose one side of the output from the 1st and 2nd receive sections, and to output to the intermediate frequency amplifier, While receiving the frequency of the passage frequency band of the 1st band pass filter, when performing transmission by the frequency of the passage frequency band of the 2nd band pass filter, To operating state, the 1st transmitting section for the 2nd receive section at non-operating state to non-operating state [the 1st receive section] To operating state, the 2nd transmitting section at the side which draws an input signal for the 1st high frequency switching circuit to the 1st receive section A selection means is controlled for the 2nd high frequency switching circuit to the output selection side from the 1st receive section in the output passage side of the 2nd transmitting section. And while performing transmission by the frequency of the passage frequency band

of the 1st band pass filter, when receiving the frequency of the passage frequency band of the 2nd band pass filter, The 1st transmitting section for the 2nd receive section to non-operating state at operating state to operating state [the 1st receive section] The 1st high frequency switching circuit to non-operating state for the 2nd transmitting section to the output passage side of the 1st transmitting section The radio receiver-transmitter characterized by having the control means which controls a selection means to the output selection side from the 2nd receive section side it leads an input signal to the 2nd receive section for the 2nd high frequency switching circuit.

[Claim 2] In a radio receiver-transmitter according to claim 1 a control means The 1st diode switch circuit which leads the input signal from the 1st band pass filter to the 1st receive section, The 2nd diode switch circuit which leads the output of the 1st transmitting section to the 1st band pass filter, The 3rd diode switch circuit which leads the input signal from the 2nd band pass filter to the 2nd receive section, The 4th diode switch circuit which leads the output of the 2nd transmitting section to the 2nd band pass filter, The 5th diode switch circuit which chooses the output of the 1st receive section, and the 6th diode switch circuit which chooses the output of the 2nd receive section, While receiving the frequency of the passage frequency band of the 1st band pass filter The 1st transistor switching means which supplies a power source to the 1st receive section and the 2nd transmitting section while controlling the 1st, 4th, and 5th diode switch circuits to an ON state, when performing transmission by the frequency of the passage frequency band of the 2nd band pass filter, While performing transmission by the frequency of the passage frequency band of the 1st band pass filter When receiving the frequency of the passage frequency band of the 2nd band pass filter, while controlling the 2nd, 3rd, and 6th diode switch circuits to an ON state The radio receiver-transmitter characterized by having the 1st transistor switching means which supplies a power source to the 2nd receive section and the 1st transmitting section.

---

2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the radio receiver-transmitter of the duplex operation which can choose a transmit-frequencies band and a received frequency band as a detail further about the radio receiver-transmitter of the duplex operation which can perform transmission and reception simultaneously on a different frequency.
[0002]
[Description of the Prior Art] This kind of conventional radio receiver-transmitter is constituted as shown in drawing 6 , amplifies the modulated wave output outputted from an antenna oscillation and a modulator 20 with power amplifier 21, and transmits the modulated wave output by which power amplification was carried out from an antenna 15. the received wave received with the antenna 15 was selectively boiled and supplied to one side of band pass filters 23 or 24 through the high-frequency switching circuit 22, the output from band pass filters 23 and 24 supplied and amplified to ejection and the high-frequency amplifier 26 through the high-frequency switching circuit 25, the magnification output supplied to the mixer circuit 27, and carried out frequency-mixing to the oscillation output from a local oscillator 28, and it supplies and amplifies to the intermediate frequency amplifier 29, and the output of a mixer circuit 27 supplied to the demodulator circuit 30, and it has restored to it. The high frequency switching circuits 22 and 25 are controlled by the switch control circuit 31 based on a transceiver frequency.
[0003] In the case of the duplex operation which transmits with fa frequency band during reception with fb frequency band, an oscillation and a modulator 20 are set up with the above-mentioned conventional radio receiver-transmitter at fa frequency band, and it transmits through power amplifier 21. On the other hand, the high frequency switching circuits 22 and 25 amplify the input signal which passed the switch and the band pass filter 24 in the high-frequency amplifier 26 to a band pass filter 24 (passage frequency band fb) side, it carries out frequency conversion to an intermediate frequency, and they amplify it with the intermediate frequency amplifier 29, and are restored to them

and outputted by the demodulator circuit 30. On the contrary, in the case of the duplex operation which transmits with fb frequency band during reception with fa frequency band, an oscillation and a modulator 20 are set as fb frequency band, and it transmits through power amplifier 21. On the other hand, the high frequency switching circuits 22 and 25 lead the input signal which passed the switch and the band pass filter 23 to the band pass filter 23 (passage frequency band fa) side to the high-frequency amplifier 26.

[0004]

[Problem(s) to be Solved by the Invention] However, when were based on the above-mentioned conventional radio receiver-transmitter, and the isolation of a high frequency switching circuit was bad, there was a trouble that the output power of a transmitter joined the high-frequency amplifier through the band pass filter with which leakage and the transmitting output which leaked make a transmit-frequencies band a passband. Furthermore, if there is much leakage and this level is high, the trouble that a lifting and receiving sensibility fall [the high-frequency amplifier and a mixer] desensitization greatly will arise. Then, although the high frequency switching circuit needed to be made into the good circuit of an isolation in order to have received in high sensitivity, the good high frequency switching circuit of an isolation was enlarged, and had the trouble of becoming expensive.

[0005] This invention aims at being able to choose a transmit-frequencies band and a received frequency band, and offering the radio receiver-transmitter which can receive high sensitivity by the small and cheap configuration.

[0006]

[Means for Solving the Problem] In the radio receiver-transmitter of the duplex operation which can perform transmission and reception simultaneously with the frequency band with which the radios receiver-transmitter of this invention differ The 1st and 2nd band pass filters with which the passage frequency bands connected to the antenna differ, The 2nd high frequency switching circuit connected to the 1st high frequency switching circuit and 2nd band pass filter which were connected to the 1st band pass filter, With the 2nd receive section which amplifies the input signal which let the 1st receive section which amplifies the input signal which let the 1st high frequency switching circuit pass, and changes into an intermediate frequency, and the 1st high frequency switching circuit pass, and changes into an intermediate frequency The 2nd transmitting section which transmits the frequency of the passage frequency band of the 2nd band pass filter through the 1st

transmitting section which transmits the frequency of the passage frequency band of the 1st band pass filter through the 1st high frequency switching circuit, and the 2nd high frequency switching circuit, A selection means to choose one side of the output from the 1st and 2nd receive sections, and to output to the intermediate frequency amplifier, While receiving the frequency of the passage frequency band of the 1st band pass filter, when performing transmission by the frequency of the passage frequency band of the 2nd band pass filter, To operating state, the 1st transmitting section for the 2nd receive section at non-operating state to non-operating state [the 1st receive section] To operating state, the 2nd transmitting section at the side which draws an input signal for the 1st high frequency switching circuit to the 1st receive section A selection means is controlled for the 2nd high frequency switching circuit to the output selection side from the 1st receive section in the output passage side of the 2nd transmitting section. And while performing transmission by the frequency of the passage frequency band of the 1st band pass filter, when receiving the frequency of the passage frequency band of the 2nd band pass filter, The 1st transmitting section for the 2nd receive section to non-operating state at operating state to operating state [the 1st receive section] It is characterized by equipping non-operating state with the control means which controls a selection means to the output selection side from the 2nd receive section side it leads [the 1st high frequency switching circuit] an input signal to the 2nd receive section for the 2nd high frequency switching circuit at the output passage side of the 1st transmitting section for the 2nd transmitting section.

[0007] In the radio receiver-transmitter of this invention a control means The 1st diode switch circuit which leads the input signal from the 1st band pass filter to the 1st receive section, The 2nd diode switch circuit which leads the output of the 1st transmitting section to the 1st band pass filter, The 3rd diode switch circuit which leads the input signal from the 2nd band pass filter to the 2nd receive section, The 4th diode switch circuit which leads the output of the 2nd transmitting section to the 2nd band pass filter, The 5th diode switch circuit which chooses the output of the 1st receive section, and the 6th diode switch circuit which chooses the output of the 2nd receive section, While receiving the frequency of the passage frequency band of the 1st band pass filter, when performing transmission by the frequency of the passage frequency band of the 2nd band pass filter The 1st transistor switching means which supplies a power source to the 1st receive section and the 2nd transmitting section while controlling the 1st, 4th, and 5th

diode switch circuits to an ON state, While performing transmission by the frequency of the passage frequency band of the 1st band pass filter, when receiving the frequency of the passage frequency band of the 2nd band pass filter While controlling the 2nd, 3rd, and 6th diode switch circuits to an ON state, it is characterized by having the 1st transistor switching means which supplies a power source to the 2nd receive section and the 1st transmitting section.

[0008]

[Function] While the radio receiver-transmitter of this invention receives the frequency of the passage frequency band of the 1st band pass filter, when performing transmission by the frequency of the passage frequency band of the 2nd band pass filter, the input signal which received through the 1st band pass filter is received in the 1st receive section, and the output from the 1st receive section is chosen by the selection means. On the other hand, the transmitting output from the 2nd transmitting section is transmitted from an antenna through the 2nd band pass filter. Since the 2nd receive section and the 1st transmitting section are controlled by non-operating state at this time even if the isolation of the 1st and 2nd high frequency switching circuit and an intermediate frequency switching circuit is bad, the 2nd receive section and the 1st transmitting section act as an attenuator, and the desensitization of the 1st receive section will be reduced and can perform reception of high sensitivity. While performing transmission by the frequency of the passage frequency band of the 1st band pass filter, when receiving the frequency of the passage frequency band of the 2nd band pass filter, the input signal which received through the 2nd band pass filter is received in the 2nd receive section, and the output from the 2nd receive section is chosen by the selection means. On the other hand, the transmitting output from the 1st transmitting section is transmitted from an antenna through the 1st band pass filter. Since the 1st receive section and the 2nd transmitting section are controlled by non-operating state at this time even if the isolation of the 1st and 2nd high frequency switching circuit and an intermediate frequency switching circuit is bad, the 1st receive section and the 2nd transmitting section act as an attenuator, and the desensitization of the 2nd receive section will be reduced and can perform reception of high sensitivity.

[0009]

[Example] Hereafter, an example explains this invention. Drawing 1 is the block diagram showing the configuration of one example of this invention.

[0010] The band pass filter 1 which makes the RF signal of fb frequency band a passband is connected to the antenna 15. The RF signal of fb frequency band changed into the electrical signal with the antenna 15 is supplied to the high frequency switching circuit 2 through a band pass filter 1. The receiving side of fb frequency band is constituted so that may supply and amplify the RF signal passing through the high frequency switching circuit 2 to the high-frequency amplifier 3, a magnification RF signal may be led to a mixer circuit 4, frequency-mixing may be carried out to the frequency of the oscillation output of a local oscillator 5 and it may change into an intermediate frequency.
[0011] On the other hand, the input signal from a microphone etc. is led to an oscillation and a modulator 9, the carrier signal oscillated in an oscillation and a modulator 9 is modulated with an input signal, and power amplification of the modulated wave signal outputted from an oscillation and a modulator 9 is supplied and carried out to power amplifier 6 through the high frequency switching circuit 10, and the transmitting side constitutes it so that a magnification output may be transmitted from an antenna 15 through a band pass filter 1 through the high frequency switching circuit 2.
[0012] Furthermore, the band pass filter 11 which makes the RF signal of fa frequency band a passband is connected to the antenna 15. The RF signal of fa frequency band changed into the electrical signal with the antenna 15 is supplied to the high frequency switching circuit 12 through a band pass filter 11. The receiving side of fa frequency band is constituted so that may supply and amplify the RF signal passing through the high frequency switching circuit 12 to the high-frequency amplifier 13, a magnification RF signal may be led to a mixer circuit 14, frequency-mixing may be carried out to the frequency of the oscillation output of a local oscillator 5 and it may change into an intermediate frequency. Furthermore, the intermediate frequency signal outputted from a mixer circuit 4 and the intermediate frequency signal outputted from a mixer circuit 14 are supplied to the intermediate frequency switching circuit 17, and chooses one side, it is supplied to the intermediate frequency amplifier 7, and it constitutes it so that the amplified intermediate frequency signal may be supplied, restored to it and outputted to a demodulator 8.
[0013] On the other hand, power amplification of the modulated wave signal from an oscillation and a modulator 9 is supplied and carried out to power amplifier 16 through the high frequency switching circuit 10, and it is constituted so that a magnification output may be transmitted from an antenna 15 through a band pass filter 11 through the high

frequency switching circuit 12.
[0014] that is, the radio receiver-transmitter of this example carried out the intermediate frequency stage in common -- the oscillation and the modulator were similarly carried out to the receiving-side RF step of the couple of a configuration in common -- it constitutes from the transmitting section of the couple of a configuration similarly.
[0015] Here during fb frequency band reception and fa frequency band transmission The high-frequency amplifier 3, a mixer circuit 4, and power amplifier 16 are controlled to operating state at the basis of control of the switch control circuit 18. The high-frequency amplifier 13, a mixer circuit 14, and power amplifier 6 are controlled to non-operating state. The high frequency switching circuit 2 is controlled in the condition of leading the output of a band pass filter 1 to a high-frequency amplifier 3. The high frequency switching circuit 12 is controlled in the condition of leading the output from power amplifier 16 to a band pass filter 11. The high frequency switching circuit 10 is controlled in the condition of leading the output modulated wave signal from an oscillation and a modulator 9 to power amplifier 16, and the intermediate frequency switching circuit 17 is controlled, respectively in the condition of leading the intermediate frequency signal by which frequency conversion was carried out in the mixer circuit 4 to the intermediate frequency amplifier 7.
[0016] On the other hand, during fa frequency band reception and fb frequency band transmission The high-frequency amplifier 3, a mixer circuit 4, and power amplifier 16 are controlled to non-operating state at the basis of control of the switch control circuit 18. The high-frequency amplifier 13, a mixer circuit 14, and power amplifier 6 are controlled to operating state. The high frequency switching circuit 12 is controlled in the condition of leading the output of a band pass filter 11 to a high-frequency amplifier 13. The high frequency switching circuit 2 is controlled in the condition of leading the output from power amplifier 6 to a band pass filter 1. The high frequency switching circuit 10 is controlled in the condition of leading the output modulated wave signal from an oscillation and a modulator 9 to power amplifier 6, and the intermediate frequency switching circuit 17 is controlled, respectively in the condition of leading the intermediate frequency signal by which frequency conversion was carried out in the mixer circuit 14 to the intermediate frequency amplifier 7.
[0017] The high frequency switching circuit 2 constitutes diodes D1 and D2 from a diode switch circuit used as a switching element, as shown in drawing 2 . During fb frequency band reception and fa frequency band

transmission, it is impressed by Terminal A by making a high potential signal into a control signal, and diode D2 is controlled to an ON state. The output from a band pass filter 1 is led to the high-frequency amplifier 3, during fa frequency band reception and fb frequency band transmission, it is impressed by Terminal B by making a high potential signal into a control signal, diode D1 is controlled to an ON state, and the output from power amplifier 6 is led to a band pass filter 1.

[0018] The high frequency switching circuit 12 as well as drawing 2 is constituted from a diode switch circuit which uses diodes D1 and D2 as a switching element. During fb frequency band reception and fa frequency band transmission, it is impressed by the terminal (A) by making a high potential signal into a control signal, and diode D1 is controlled to an ON state. The output from power amplifier 16 is led to a band pass filter 11, during fa frequency band reception and fb frequency band transmission, it is impressed by the terminal (B) by making a high potential signal into a control signal, diode D2 is controlled to an ON state, and the output from a band pass filter 11 is led to the high-frequency amplifier 13.

[0019] The high frequency switching circuit 10 as well as drawing 2 is constituted from a diode switch circuit which uses diodes D1 and D2 as a switching element. During fb frequency band reception and fa frequency band transmission, it is impressed by the terminal (A) by making a high potential signal into a control signal, and diode D1 is controlled to an ON state. The output modulated wave signal from an oscillation and a modulator 10 is led to power amplifier 16, during fa frequency band reception and fb frequency band transmission, it is impressed by the terminal (B) by making a high potential signal into a control signal, diode D2 is controlled to an ON state, and the output modulated wave signal from an oscillation and a modulator 10 is led to power amplifier 6.

[0020] The intermediate frequency switching circuit 17 constitutes diodes D3 and D4 from a diode switch circuit used as a switching element, as shown in drawing 3 . During fb frequency band reception and fa frequency band transmission, it is impressed by Terminal A by making a high potential signal into a control signal, and diode D3 is controlled to an ON state. The intermediate frequency signal outputted from a mixer circuit 4 is led to the intermediate frequency amplifier 7. During fa frequency band reception and fb frequency band transmission, it is impressed by Terminal B by making a high potential signal into a control signal, diode D4 is controlled to an ON state, and the intermediate frequency signal outputted from a mixer circuit 14 is led to the

intermediate frequency amplifier 7.
[0021] The switch control circuit 18 from the microcomputer 19 which controls a radio receiver-transmitter to be shown in drawing 4 The electrical potential difference which serves as low voltage only during fb frequency band reception and fa frequency band transmission controls a current at the base of a transistor Q1, and controls the sink transistor Q1 to an ON state. While being impressed by the high-frequency amplifier 3, the mixer circuit 4, and power amplifier 16 as supply voltage by making the electrical potential difference through a transistor Q1 into supply voltage and controlling to operating state It is impressed by terminal [of the high frequency switching circuits 2, 10, and 12 and the intermediate frequency switching circuit 6] A (A). Lead the output of a band pass filter 1 to a high-frequency amplifier 3, and the output from power amplifier 16 is led to a band pass filter 11. It controls to lead the output modulated wave signal from an oscillation and a modulator 9 to power amplifier 16, and to lead the intermediate frequency signal by which frequency conversion was carried out in the mixer circuit 4 to the intermediate frequency amplifier 7.
[0022] Moreover, the electrical potential difference from which the switch control circuit 18 serves as low voltage only during fa frequency band reception and fb frequency band transmission controls a current at the base of a transistor Q2, and controls the sink transistor Q2 to an ON state. While being impressed by the high-frequency amplifier 13, the mixer circuit 14, and power amplifier 6 as supply voltage by making the electrical potential difference through a transistor Q2 into supply voltage and controlling to operating state It is impressed by terminal [of the high frequency switching circuits 2, 10, and 12 and the intermediate frequency switching circuit 6] B (B). Lead the output of a band pass filter 11 to a high-frequency amplifier 13, and the output from power amplifier 6 is led to a band pass filter 1. The intermediate frequency switching circuit 17 is controlled, respectively in the condition of leading the output modulated wave signal from an oscillation and a modulator 9 to power amplifier 6, and leading the intermediate frequency signal by which frequency conversion was carried out in the mixer circuit 14 to the intermediate frequency amplifier 7.
[0023] Moreover, the passage frequency characteristics of band pass filters 1 and 11 are constituted so that it may have the property shown in a and b in drawing 5 .
[0024] In the radio receiver-transmitter of this example constituted as mentioned above, during fb frequency band reception and fa frequency band transmission, a transistor Q1 is controlled by the ON state, and

the electrical potential difference through a transistor Q1 is impressed as supply voltage, and a high-frequency amplifier 3, a mixer circuit 4, and power amplifier 16 are made into operating state, and are impressed to terminal [of the high frequency switching circuits 2, 10, and 12 and the intermediate frequency switching circuit 6] A (A). Therefore, the high frequency switching circuit 12 is switched to a power amplifier 16 side, and the intermediate frequency switching circuit 17 is switched for the high frequency switching circuit 2 to a high-frequency amplifier 3 side at a mixer circuit 4 side.

[0025] Therefore, it is led to the high-frequency amplifier 3 through the high frequency switching circuit 2, and is amplified in the high-frequency amplifier 3, and frequency conversion is carried out to an intermediate frequency signal in a mixer circuit 4, and through the intermediate frequency switching circuit 17, the input signal of fb frequency band which passed along the band pass filter 1 is led to the intermediate frequency amplifier 7, is amplified, and gets over in a demodulator 8.

[0026] On the other hand, an oscillation and a modulator 9 oscillate the subcarrier of fa frequency frequency band, and applies a modulation to this, the output modulated wave signal from an oscillation and a modulator 9 is supplied to power amplifier 16 through the high frequency switching circuit 10, power amplification is carried out in power amplifier 16, and the transmitting output by which power amplification was carried out is transmitted through a band pass filter 11 and an antenna 15 through the high frequency switching circuit 12. Consequently, the communication link by the duplex operation to which transmission of the transmitting output of fa frequency band is performed, and reception of the input signal of fb frequency band is performed is made.

[0027] In addition, in this case, the high-frequency amplifier 13, a mixer circuit 14, and power amplifier 6 are not controlled by operating state, but are made into non-operating state. Therefore, since power amplifier 6 is controlled by non-operating state when eye SORESHON of the high frequency switching circuits 2 and 10 is not so good and there is much leakage of the transmitting output from the high frequency switching circuit 10, The high frequency signal with which the frequency fa leaked does not leak to a high-frequency amplifier 3, and when the isolation of the high frequency switching circuit 12 is not still so better and there is much leakage of the transmitting output from power amplifier 16, it also sets. Since the high-frequency amplifier 13 and a mixer circuit 14 are controlled by non-operating state, Even if the transmitting output from which the frequency fa leaked does not leak to

the intermediate frequency switching circuit 17 and the isolation of the intermediate frequency switching circuit 17 is not so good, it does not leak to a mixer circuit 4 side.

[0028] That is, since the power amplifier 6, the high-frequency amplifier 13, and mixer circuit 14 which do not start desensitization in the high-frequency amplifier 3 and a mixer circuit 4, and have become non-operating state act as an attenuator and make a leakage transmitting output small consequently, desensitization is small and reception of high sensitivity can perform fb frequency band reception.

[0029] Moreover, during fb frequency band transmission and fa frequency band reception, a transistor Q2 is controlled by the ON state, and the electrical potential difference through a transistor Q2 is impressed as supply voltage, and the high-frequency amplifier 13, a mixer circuit 14, and power amplifier 6 are made into operating state, and are impressed to reverse at terminal [of the high frequency switching circuits 2, 10, and 12 and the intermediate frequency switching circuit 6] B (B). Therefore, the high frequency switching circuit 12 is switched to a power amplifier 6 side, and the intermediate frequency switching circuit 17 is switched for the high frequency switching circuit 2 to a high-frequency amplifier 13 side at a mixer circuit 14 side.

[0030] Therefore, it is led to the high-frequency amplifier 13 through the high frequency switching circuit 12, and is amplified in the high-frequency amplifier 13, and frequency conversion is carried out to an intermediate frequency signal in a mixer circuit 14, and through the intermediate frequency switching circuit 17, the input signal of fa frequency band which passed along the band pass filter 11 is led to the intermediate frequency amplifier 7, is amplified, and gets over in a demodulator 8.

[0031] On the other hand, an oscillation and a modulator 9 oscillate the subcarrier of fb frequency frequency band, and applies a modulation to this, the output modulated wave signal from an oscillation and a modulator 9 is supplied to power amplifier 6 through the high frequency switching circuit 10, power amplification is carried out in power amplifier 6, and the transmitting output by which power amplification was carried out is transmitted through a band pass filter 1 and an antenna 15 through the high frequency switching circuit 2. Consequently, the communication link by the duplex operation to which transmission of the transmitting output of fb frequency band is performed, and reception of the input signal of fa frequency band is performed is made.

[0032] In addition, in this case, the high-frequency amplifier 3, a mixer circuit 4, and power amplifier 16 are not controlled by operating

state, but are made into non-operating state. Therefore, when the isolation of the high frequency switching circuits 12 and 10 is not so good in this case and there is much leakage of the transmitting output from the high frequency switching circuit 12, it also sets. Since power amplifier 16 is controlled by non-operating state, the RF signal output from which the frequency fb leaked does not leak to the high-frequency amplifier 13. Furthermore, since the high-frequency amplifier 3 and a mixer circuit 4 are controlled by non-operating state when the isolation of the high frequency switching circuit 2 is not so good and there is much leakage of the transmitting output from power amplifier 6, Even if the transmitting output from which the frequency fb leaked does not leak to the intermediate frequency switching circuit 17 and the isolation of the intermediate frequency switching circuit 17 is not so good, it does not leak to a mixer circuit 14 side.

[0033] That is, since the power amplifier 16, the high-frequency amplifier 3, and mixer circuit 4 which do not start desensitization in the high-frequency amplifier 13 and a mixer circuit 14, and have become non-operating state act as an attenuator and make a leakage transmitting output small consequently, desensitization is small and reception of high sensitivity can perform fa frequency band reception. While a duplex operation communication link on two different frequencies can carry out by high sensitivity as mentioned above, transmit frequencies and received frequency can be chosen.

[0034] Moreover, by carrying out on-off control of each of the high-frequency amplifier 3, a mixer circuit 4 and power amplifier 6, the high-frequency amplifier 13, a mixer circuit 14, and power amplifier 16 still more finely, simplex communication can carry out with fa frequency band and fb frequency band, and can also perform further the semi-duplex operation communication link which used fa frequency band and fb frequency band. That is, simplex communication, a semi-duplex operation communication link, and a duplex operation communication link can also be chosen with fa frequency band and fb frequency band.

[0035] Furthermore, many frequencies can also be chosen by increasing the number of a band pass filter, a high-frequency amplifier, a mixer circuit, and power amplifier, and increasing the number of selections by the high frequency switching circuit and the intermediate frequency switching circuit.

[0036]

[Effect of the Invention] Since the receive section of the direction which has not received, and the transmitting section of the direction which has not transmitted are made into non-operating state according to

this invention as explained above, even if the isolation of the 1st and 2nd high frequency switching circuit and an intermediate frequency switching circuit is bad, the receive section and the transmitting section which are made into non-operating state act as an attenuator, and the leakage of the transmitting output to the receive section in operating state has the effectiveness which decreases extremely. moreover -- for this reason, it is not influenced of working **** leakage, but there is effectiveness which can perform sensibility reception.

[0037] Moreover, since a control means can be constituted from a diode switch circuit and a transistor switching means, it is effective in a configuration being easy and ending.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the radio receiver-transmitter of one example of this invention.

[Drawing 2] It is the circuit diagram showing the configuration of the high frequency switching circuit in the radio receiver-transmitter of one example of this invention.

[Drawing 3] It is the circuit diagram showing the configuration of the intermediate frequency switching circuit in the radio receiver-transmitter of one example of this invention.

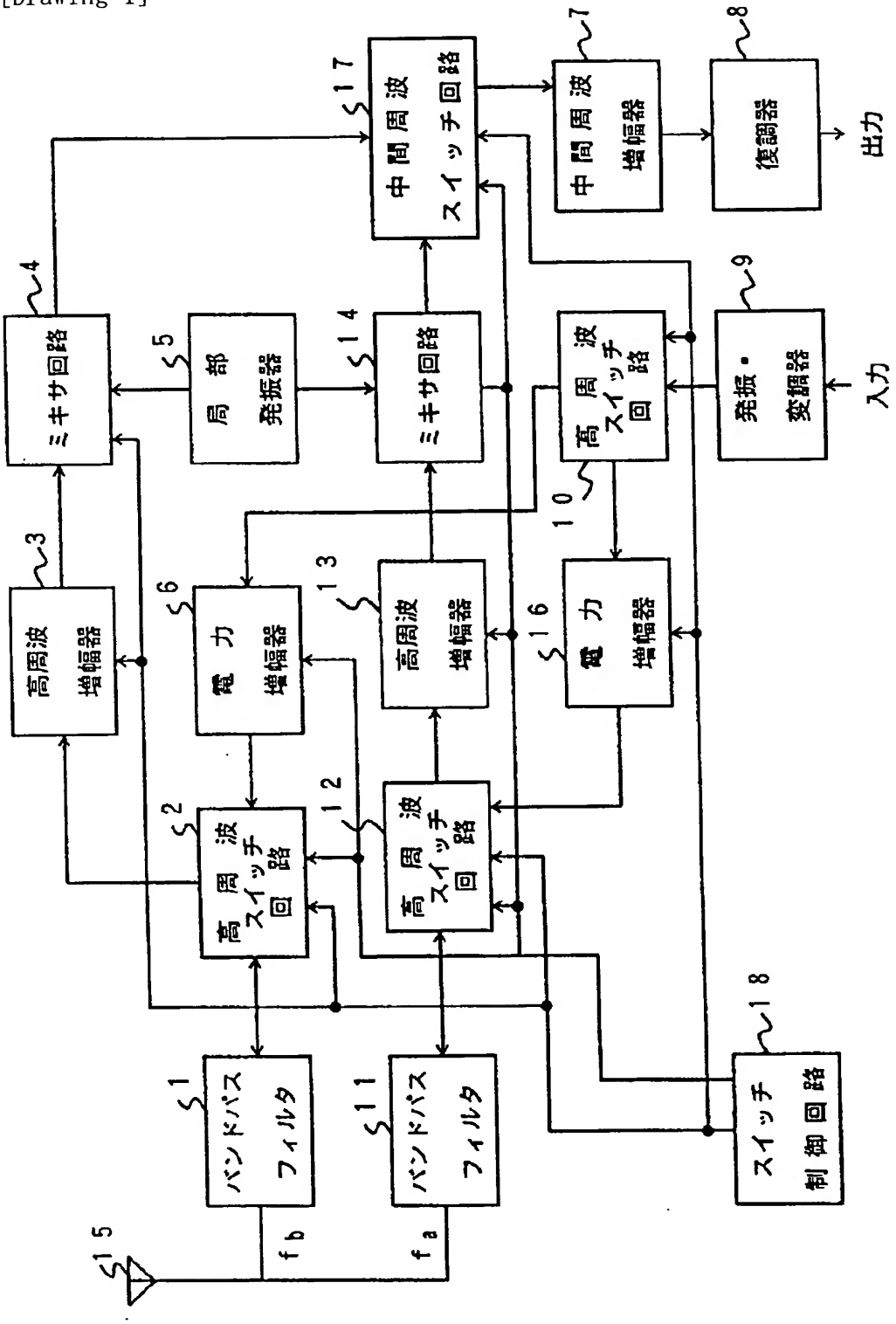
[Drawing 4] It is the block diagram showing the configuration of the switch control circuit in the radio receiver-transmitter of one example of this invention.

[Drawing 5] It is frequency-characteristics drawing of the band pass filter in the radio receiver-transmitter of one example of this

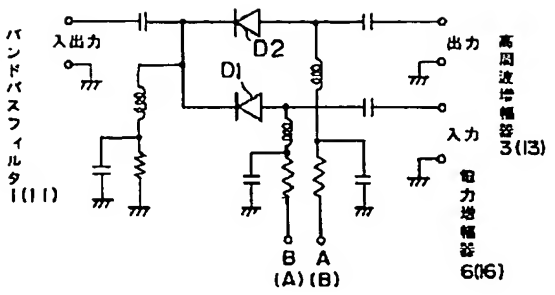
invention.
[Drawing 6] It is the block diagram showing the configuration of the radio receiver-transmitter of the conventional example.
[Description of Notations]
1 and 11 Band pass filter
2, 10, and 12 High frequency switching circuit
3 and 13 High-frequency amplifier
4 and 14 Mixer circuit
5 Local Oscillator
6 and 16 Power amplifier
7 Intermediate Frequency Amplifier
8 Demodulator
9 Oscillation and Modulator
17 Intermediate Frequency Switching Circuit
18 Switch Control Circuit
19 Microcomputer

DRAWINGS

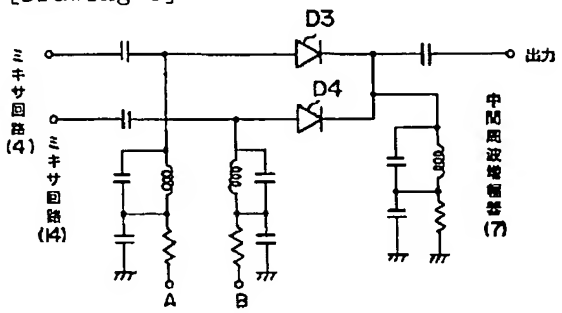
[Drawing 1]



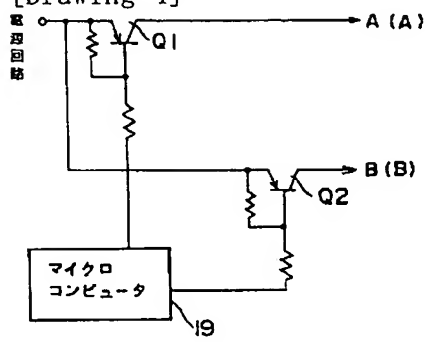
[Drawing 2]



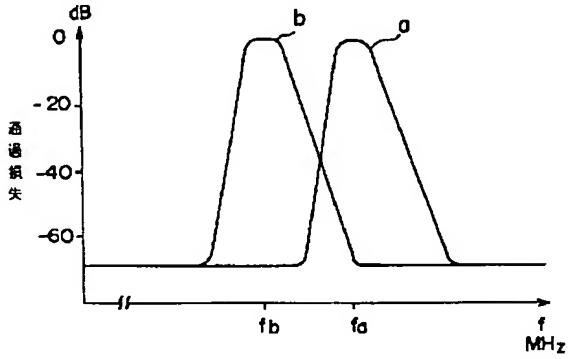
[Drawing 3]



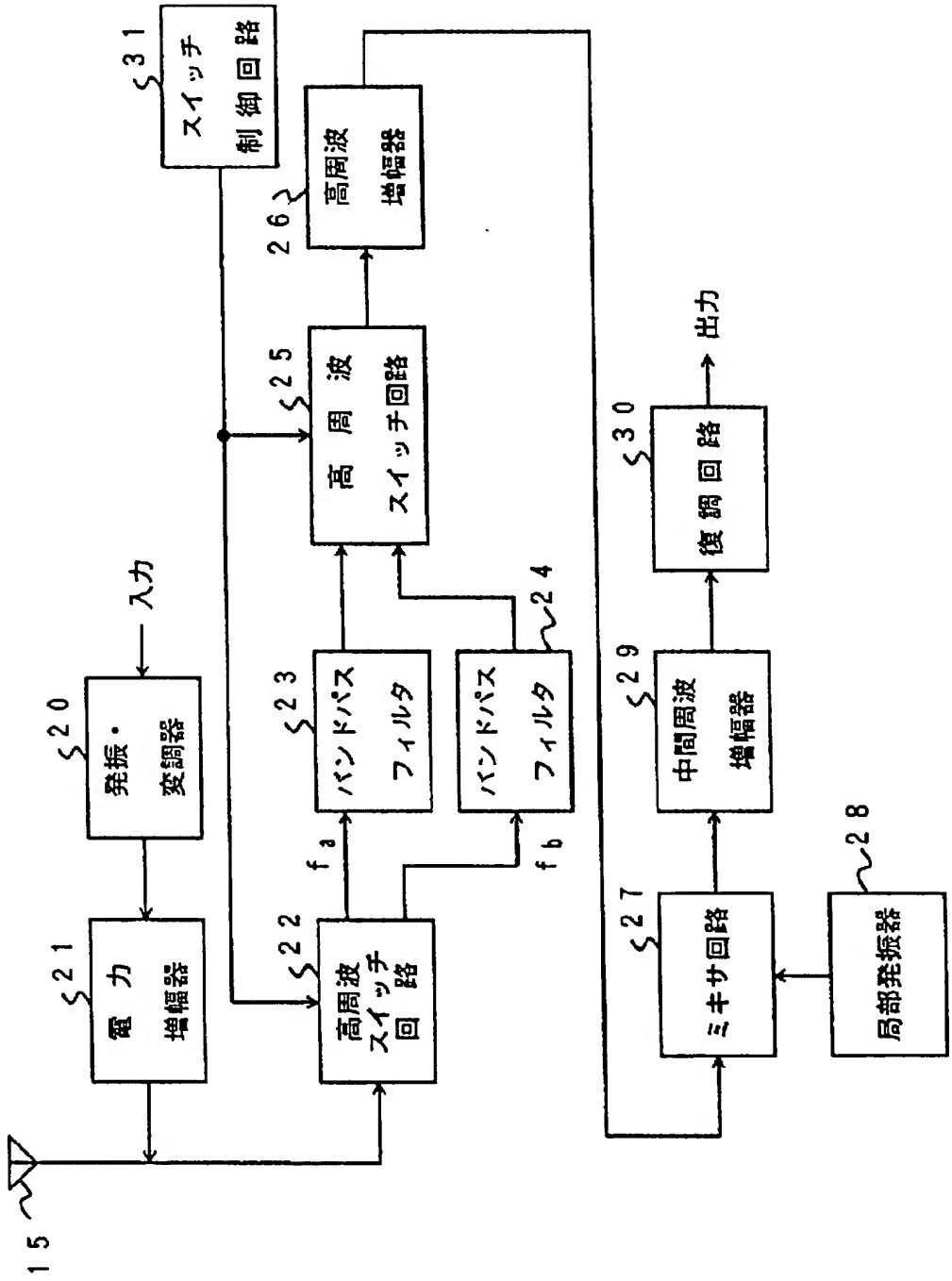
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]